Villupuram model public question 2022

CLASS: X STD   TIME : 3 Hrs
SUBJECT : MATHEMATICS   MARK : 100

Section - A

I. Choose the correct answer: 14 X 1 = 14

1. If A={1,2,}, B={1,2,3,4}, C={5,6} and D={5,6,7,8} then state which of the following is true
    a) (A x C) C (B x D)   b) (B x D) C (A x C)
    c) (A x B) C (A x D)   d) (D x A) C (B x A)

2. If the ordered pairs **(a+2, 4)** and **(5,2a+b)** are equal then **(a,b)** is
    a) (2,-2)   b) (5,1)   c) (2,3)   d) (3,2)

3. The sum of the exponents of the prime factors in the prime factorization of **1729** is
    a) 1   b) 2   c) 3   d) 4

4. If 6 times of 6th term of an **A.P** is equal of 7 times the 7th term, then the 13th term of the A.P is
    a) 0   b) 6   c) 7   d) 13

5. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the $x - axis$ is
    a) 0   b) 1   c) 0 or 1   d) 2

6. The solution of $(2x - 1)^2 = 9$ is equal to
    a) -1   b) 2   c) -1, 2   d) none of these

7. In Δ LMN, $\angle L = 60^0$, $\angle M = 50^0$, If Δ LMN $\sim$ Δ PQR then the value of $\angle R$ is
    a) 40^0 b) 70^0 c) 30^0 d) 110^0

8. The straight line given by the equation $x = 11$ is
    a) parallel to x axis   b) parallel to y axis
    c) passing through the origin d) parallel through the point (0,11)

9. The point of intersection of $3x - y = 4$ and $x + y = 8$ is
    a) (5,3)   b) (2,4)   c) (3,5)   d) (4,4)

10. A tower stands vertically on the ground from point on the ground which is **48m** away from the foot of the tower the angle of elevation of the top of the tower is 30^0, height of tower is
    a) $15\sqrt{2}m$ b) $12\sqrt{3}m$ c) $16\sqrt{3}m$ d) $10\sqrt{2}m$

11. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$ the angle of elevation of the sum has measure

    a) 45^0 b) 30^0 c) 90^0 d) 60^0

12. The height of a right circular cone whose radius is **5cm** and slant height is **13cm** will be

    a) 12cm   b) 10cm   c) 13cm   d) 5cm

13. The ratio of the volumes of a cylinder, a cone and sphere of each the same diameter and same height is

    a) $1 : 2 : 3$ b) $2 : 1 : 3$ c) $1 : 3 : 2$ d) $3 : 1 : 2$

14. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$ then the value of x is
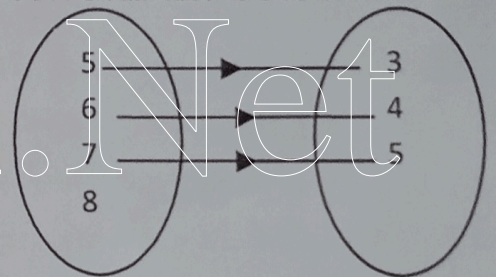
    a) 2   b) 1   c) 3   d) 1.5

PART – B

II. Answer any 10 questions: Q.No:28 is compulsory.   **10X2= 20**

15. The arrow diagram shows a relationship between the sets **P** and Write the relation in   i) Set builder form
    ii) Roaster form
    iii) What is domain and range of **R**.

16. When the positive integers **a, b** and c are divided by **13** the respective remainders are **9, 7, 10**. Find remainder when $a + 2b + 3c$ is divided by **13**.

17. Find 15th, 24th, term of an A.P given by **3, 15, 27, 39………**

18. If $13824 = 2^a \times 3^b$ find **a** and **b**.

19. Find zeros of quadratic expression $x^2 + 8x + 12$.

20. Solve $PQ\, x^2 - (p + q))^2 x + (p + q)^2 = 0$.

21. Solve $2x - 3y = 6,\ x + y = 1$.

22. In two concentric circles, a chord of length **16cm** of larger circle become a tangent to the smaller circle whose radius is **6cm**. Find radius of larger circle.

23. Find the intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axes.

24. Find equation of straight line which has slope $\dfrac{-5}{4}$ and passing through **(-1,2)**.

25. From the top of rock $50\sqrt{3}m$ high, the angle of depression of a car on the ground is observed to be 30^0. Find the distance of car from the rock.

26. The volume of two cones of same base radius are $3600cm^3$ and $5040cm^3$. Find the ratio of their heights.

27. The curved surface area of a right circular cylinder of height **14 cm** is $88cm^2$. Find the diameter of the cylinder.

28. What is the probability that a leap year selected at random will contain **53 Saturdays**.

PART – C

Answer any 10 questions : Q .No : 42 is compulsory   10X5=50

29. Let $A = \{x \epsilon N / 1 < x < 4\}$, $B = \{x \epsilon W / 0 \le x < 2\}$ and $C = \{x \epsilon N / x < 3\}$ then,

verify that $A \, X \, (B \, U \, C) = (A \, X \, B) U \, (A \, X \, C)$.

30. Represent each of the given relations by **a)** an arrow diagram **b)** a graph   **c)** a set in roster form . Where possible

i) $\{(x, y) / x = 2y, x \epsilon \{2, 3, 4, 5\}, \quad y = \{1, 2, 3, 4\}\}$

31. Find the **HCF** of **396, 504, 636**.

32. The ratio of 6th and 8th term of an A.P is **7 : 9**. Find the ratio of 9th term to 13th term.

33. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$.

34. Solve the following quadratic equations by formula method
$\dfrac{5x+7}{x-1} = 3x + 2$.

35. State and prove **BPT** theorem.

36. Find the equation of the median and altitude of Δ **ABC** through **A**, where the vertices are **A (6 , 2), B (-5 , -1)** and **C (1 , 9)**.

37. Let **A(1 , -2), B(6 , -2), C(5 , 1)** and **D(2 , 1)** be four points.

i) Find the slope of the line segment   **a) AB b) CD**

ii) Find the slope of the line segment   **a) BC   b) AD**

iii) What can you deduce from your answer.

·38. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a **30m** high building are 45^0 and 60^0 respectively. Find the height of the tower. ($\sqrt{3} = 1.732$)

· 39. An aeroplane of an altitude of **1800m,** finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60^0 and 30^0. Respectively find the distance between the two boats. ($\sqrt{3} = 1.732$)

40. The ratio of the volumes of two cone is **2 : 3,** Find the ratio of their radii if the height of second cone is double the height of the first.

41. A capsule is in the shape of a cylinder with two hemisphere stude to each of its ends. If the length of the entire capsule is **12mm** and the diameter of the capsule is **3mm**. How much medicine it can hold?

42. Three fair coins are tossed together. Find the probability of getting

     i) all heads   ii) at least one tail

     iii) at most one head   iv) at most two tails

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PART – D   **2 X 8 = 16**

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43. a) Graph the quadratic equations and state their nature of solutions.

$$x^2 - 6x + 9 = 0 \text{ (or)}$$

   b) Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$.

44. a)Construct a triangle similar to a given triangle LMN with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle LMN (scale factor $\frac{4}{5}$)   (or)

   b) Draw the two tangents from a point which is **5cm** away from the centre of a circle of diameter **6cm**. Also measure the length of the tangents.